

# Species

## A review on medicinal value of Xi – Shu tree

Balasubramanian J<sup>1,2&4\*</sup>, Narayanan N<sup>3&4</sup>

1. Shield Health Care Pvt Ltd, Chennai-600 095, India
2. Sai Bio – Sciences Pvt Ltd, Chennai-600 094, India
3. Jaya College of Pharmacy, Avadi, Chennai – 602 024, India
4. Periyar Maniammai University, Thanjavur-613 403, Tamilnadu, India

\*Correspondence to: E-mail: jvbalpharm@yahoo.co.in

Received 09 October; accepted 12 November; published online 01 December; printed 16 December 2012

### ABSTRACT

Xi shu (*Camptotheca acuminata*) belongs to the Nyssaceae family and is a huge tree growing up to a height of 25 meters having thin reddish-brown bark and a small number of branches close to its apex. In China people have named this tree as the happy tree owing to its effectiveness in treating a number of ailments and colds. The American species of xi shu is known as *Camptotheca*. The plant has number of medicinal value especially in treating cancer. In effect, they have used this herb to treat psoriasis as well as to cure ailments related to the stomach, liver, spleen and gallbladder.

### 1. INTRODUCTION

This tree produces shiny green, leathery leaves, while the small, white flowers have curved heads. Currently, herbalists are developing cultivars having more yields of active compounds. As is evident from the name of the tree, it is native to China and currently, it is cultivated in the form of an ornamental tree in various countries, such as the United States, India and Japan. In China, Xi shu has been categorized in the list of endangered plants and, hence, exports of *Camptotheca acuminata* from China have been restricted.

*Camptotheca acuminata* is a member of Nyssaceae plant family. The plant was found in southern China and Tibet. *Camptotheca* is commonly known to the native people as xi shu (happy tree), long shu (dragon tree), jia shu (fine tree), tian zi shu (heaven wood tree). The plant is typically 25 meters all. It branches out very little up top. The leaves are green and leathery-like. The flowers are whitish, and blossom annually. Currently *Camptotheca acuminata* is listed as an endangered species in China. All exports are being regulated. Though China and Tibet are homes of *Camptotheca*, it survives if grown properly elsewhere in warm geographical places. In recent years, both India and Japan began to grow *Camptotheca* as crops.

### 2. COMMON NAMES

- Cancer Tree
- Happy Tree
- Tree of Joy
- Xi Shu

In China people have named this tree as the happy tree owing to its effectiveness in treating a number of ailments and colds. The American species of xi shu is known as *Camptotheca*. This particular tree has been used since long past in Chinese herbal medicine. For several centuries, xi shu has been effective in treating conditions like Liver elements, psoriasis, stomach problems, gallbladder disease as well as ailments of the spleen. Xi shu encloses a chemical substance known as camptothecin, a medication that is used for treating various forms of cancer. Findings of numerous researches with xi shu have demonstrated that the extracts obtained from this tree inhibit tumors or cancerous growth. It is interesting to note that many anti-cancer medications have been developed from camptothecin. Two such drugs have been approved for sale and use by the Food and Drug Administration (FDA).

It has been proved that using xi shu is safe and it does not cause any harm to the body. However, it is advisable that when you are using this herb to treat any health condition, you should essentially consult a qualified and competent medical practitioner. This herb should never be used to treat any form of cancer unless the patient is under the supervision and care of a physician. Currently, scientists have undertaken a number of studies with this tree in Texas, where it is being grown. In addition, xi shu is also being studied by researchers at the Louisiana State University.

### 3. PARTS USED

Wood, bark, leaf and fruit.

### 4. HABITAT AND CULTIVATION

As aforementioned, xi shu (*Camptotheca acuminata*) is native to China and Tibet. This tree grows most excellently in places having warm and damp climatic conditions. Xi shu can also grow and thrive in sunny positions and soil having rich humus content. Xi shu loathes drying out.

### 5. CAMPATOTHECA

*Camptotheca* is known by several names in the land of its origin - China. Xi shu literally translated into English denotes a 'happy tree' and has been known by this name by people who have been cured of colds as well as other ailments by using this herb. This tree has several other names, such as Balasubramanian et al.

A review on medicinal value of Xi – Shu tree, *Species*, 2012, 1(3), 28-29,

© The Author(s) 2012. Open Access. This article is licensed under a [Creative Commons Attribution License 4.0 \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).



## SPECIES OF THE MONTH

long shu (dragon tree), tian zi shu (heaven wood tree) and jia shu (fine tree). Apart from using this tree for therapeutic purpose, the Chinese have used xi shu in the form of firewood as well as an ornamental plant. It may be noted here that the American species of xi shu is actually offspring of two trees that have been germinated and purchased from China in the 1930s.

For several hundred or possibly even thousand years now, the Chinese have employed xi shu as a traditional medication. Interestingly enough, xi shu has also been employed to cure leukemia. In effect, 'cancer tree' is one of the common names of *Camptotheca*. The major active constituent of *Camptotheca* called camptothecin is known to be effective in treating cancer. This element actually slows down the secretion of topoisomerase I, an enzyme related to cell division as well replication of the DNA. It has been found that camptothecin actually stunts the growth of tumours by slowing down the production of this particular enzyme.

Several other anti-cancer drugs have been developed using camptothecin and two among these have even been approved by the United States Food and Drug Administration (FDA) for sale and use to treat different forms of cancer. While the prescription drug Topotecan, which has been modified from camptothecin, is given to patients suffering from ovarian and small lung cancer, the other medication developed from camptothecin is irinotecan, which is used to treat metastatic colorectal cancer (a form of cancer which develops in the colon or rectum and subsequently extends to other parts of the body). In effect, today metastatic colorectal cancer is the second most important cause of deaths owing to cancer in the United States. It may be noted here that other anti-cancer drugs developed from camptothecin are not used any longer owing to their acute toxicity.

### 5.1. Chemical constituents

Chemical analysis of xi shu has revealed that it contains camptothecin, a pentacyclic quinoline alkaloid, which is the main chemical compound present in this herb. Precisely speaking the stem bark of the tree contains approximately 0.01 per cent; root bark contains 0.02 per cent, while the fruits of the tree enclose 0.03 per cent of camptothecin. It may be noted that camptothecin is not very water soluble and results in acute side effects like hemorrhagic cystitis and diarrhea. Therefore, a variety of partially synthetic equivalents have been developed - counting 9-amino-20S-camptothecin, topotecan (Hycamtin) and irinotecan (which is also called irinotecan hydrochloride trihydrate, Camptosar or CPT-II).

It has been proved that camptothecin possesses cytostatic as well as anti-tumour actions. However, it is also somewhat noxious. The herb's anti-cancer actions is owing to the exceptional competence of camptothecin as well as associated compounds to slow down the production of the nuclear DNA topoisomerase I enzyme, which actually disrupts the reproduction as well as duplication of cancerous cells.

As mentioned earlier, camptothecin (a pentacyclic quinoline alkaloid) is the most active constituent of xi shu. The tree's root barks, stem bark as well as the seeds have the aptitude to yield some amounts of camptothecin. However, the maximum concentration of this alkaloid is found in the young and tender leaves of this tree.

### 5.2. Dosage

Genuine alkaloids obtained from xi shu, for instance camptothecin, are administered to patients via intravenous drip. If you are using irinotecan, the dosage is 100 mg per m<sup>2</sup> of the patient's body surface in a weekly therapy repeated six times or more. In folk medicine, lesser potent infusions are employed.

### 5.3. Special characteristics

The flowers of *Camptotheca acuminata* looks like white "Sputniks" of Button Bush (*Cephalanthus occidentalis*). The genus name, "*Camptotheca*," may be translated from the Greek as 'curved sheath.' It probably refers to the small, banana-like pods emanating from a central point to form a round cluster that is the fruit of *Camptotheca acuminata*. Parts of the "Happy Tree" have been used from times of antiquity to the present day in traditional Chinese medicine to provide treatments for ailments as diverse as psoriasis, liver and stomach ailments, and common colds. It is also used to treat leukemia. This latter use led to scientific study to determine if there actually was an anti-cancer compound in *C. acuminata*. The cancer-fighting properties were first verified in 1958 by Dr. Monroe E. Wall of the USDA and Jonathon Hartwell of the National Cancer Institute in the United States. The active ingredient in the plant was found to be Camptothecin (a pentacyclic quinoline alkaloid). The stem bark, root bark, and seeds can yield trace amounts of Camptothecin, but the highest concentrations may be in the tender young leaves. Camptothecin and its analog compounds can inhibit the nuclear DNA topoisomerase I enzyme and has the effect of interrupting the replication and transcription of cancer cells. Camptothecin is not water-soluble and can be highly toxic, making it difficult to administer as a medicine. After decades of extensive trials, several relatively safe and effective water-soluble semi-synthetic analogs of Camptothecin have been developed. These include the brand names Camptosar by Pharmacia, Hycamtin by GlaxoSmithKline, and CPT11 by Aventis.

### 5.3. Pharmaceutical approach on Xi - SHU

Worldwide sales of these drugs have collectively reached about \$1 billion annually. The raw material for these drugs is still only available from the *C. acuminata* trees. The harvesting of *C. acuminata* for the pharmaceutical industry has decimated the population of the endemic trees in China. The tree may now be considered as "Endangered" by the government of China and export is severely restricted. It is estimated that less than 4,000 of the trees remain in the wild in China. In June 2000, an abstract discussing efforts to grow *C. acuminata* in Louisiana as a silviculture crop to supply raw materials to the pharmaceutical industry was presented at the U.S. Forest Product Society's 54th Annual Meeting. It is not known if the plan to commercially cultivate *C. acuminata* was implemented.

## COMMENTS

Parts of the "Happy Tree" have been used from times of antiquity to the present day in traditional Chinese medicine to provide treatments for ailments as diverse as psoriasis, liver and stomach ailments, and common colds. It is also used to treat leukemia. This latter use led to scientific study to determine if there actually was an anti-cancer compound in *C. acuminata*. The cancer-fighting properties were first verified in 1958 by Dr. Monroe E. Wall of the USDA and Jonathon Hartwell of the National Cancer Institute in the United States.